

## LA-UR-19-25711

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# ALDCP Student Team Weekly Briefing

Week 2 Briefing  
Matney Juntunen  
June 13<sup>th</sup>, 2019

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# Safety Share: Chemical Hazards

## Hazard Classifications:

### Health:

- Toxicity
- Sensitization
- Carcinogenic
- Mutagenic

### Physical:

- Flammable/Explosive
- Reactive
- Oxidizer
- Corrosive
- Irritant
- Pressurized gas



Understanding hazards prevents employees from injury/illness due to exposure.

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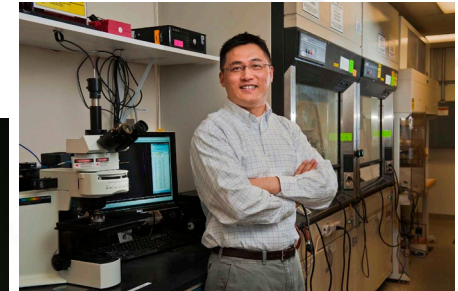
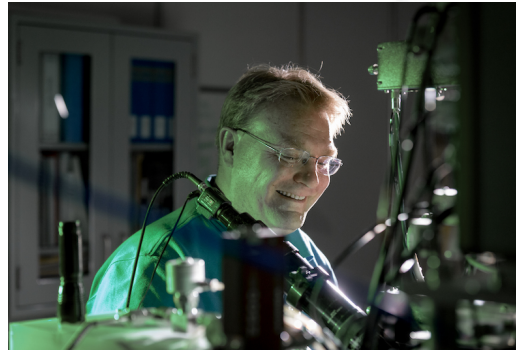
# SMART LAB Project

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# What is a Smart Lab?

## SMART LAB KEY COMPONENTS

- 1 Fundamental platform of dynamic, digital control systems
- 2 Demand-based ventilation
- 3 Exhaust fan discharge velocity optimization
- 4 Pressure drop optimization
- 5 Fume hood flow optimization
- 6 Low power density, demand based lighting
- 7 Commissioning with automated cross platform fault detection



Smart Labs aims to reduce energy demands for laboratories.

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# Smart Lab's Project Scope: CINT Engineering Project

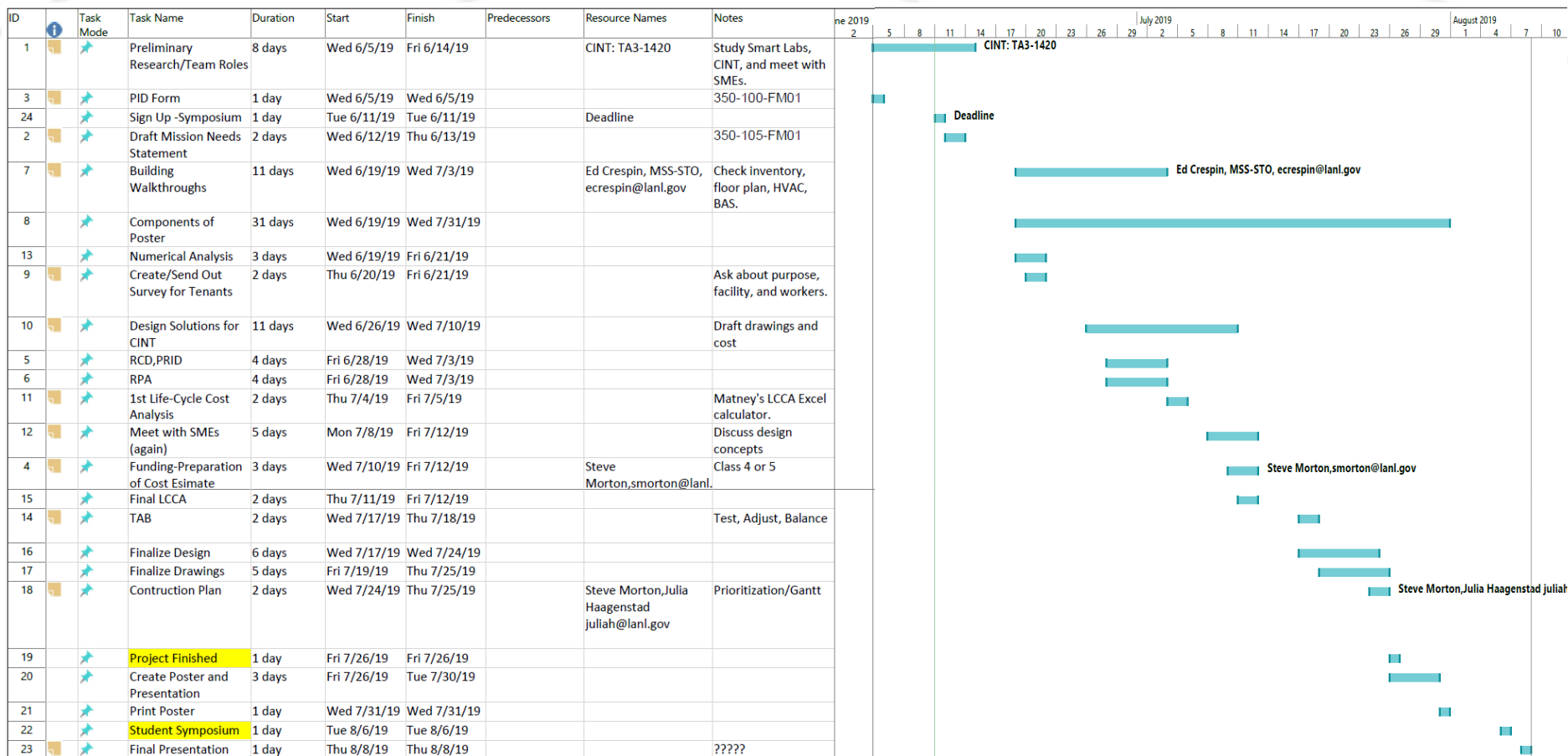
- Identify/Define problems to be solved in TA-03-1420 (CINT)
- Propose renovations regarding key Smart Lab components
- Perform life-cycle cost analysis for the proposed renovations
- Learn and use Project Management roles/skills

We are aiding the implementation of the Smart Lab initiative at LANL.

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# Gantt Chart



The Smart Lab design for CINT will be completed by July 26<sup>th</sup>, 2019

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# Accomplishments and Barriers:

## ACCOMPLISHMENTS:

- General research
- Six SME meetings
- Gantt chart
- Team roles
- PID
- Draft of tenant questions
- Draft Mission Needs Statement

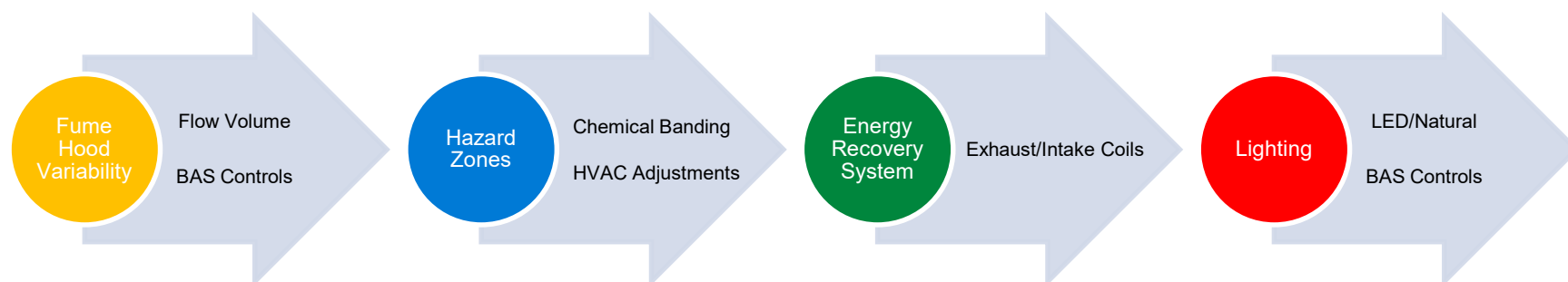
## BARRIERS:

- Response from CINT to schedule group tour
- Transportation

Progress continues ahead of schedule toward our scope of work.

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# Group Brainstorming: Current Design Subjects



We must understand the purpose of CINT to successfully design for it.

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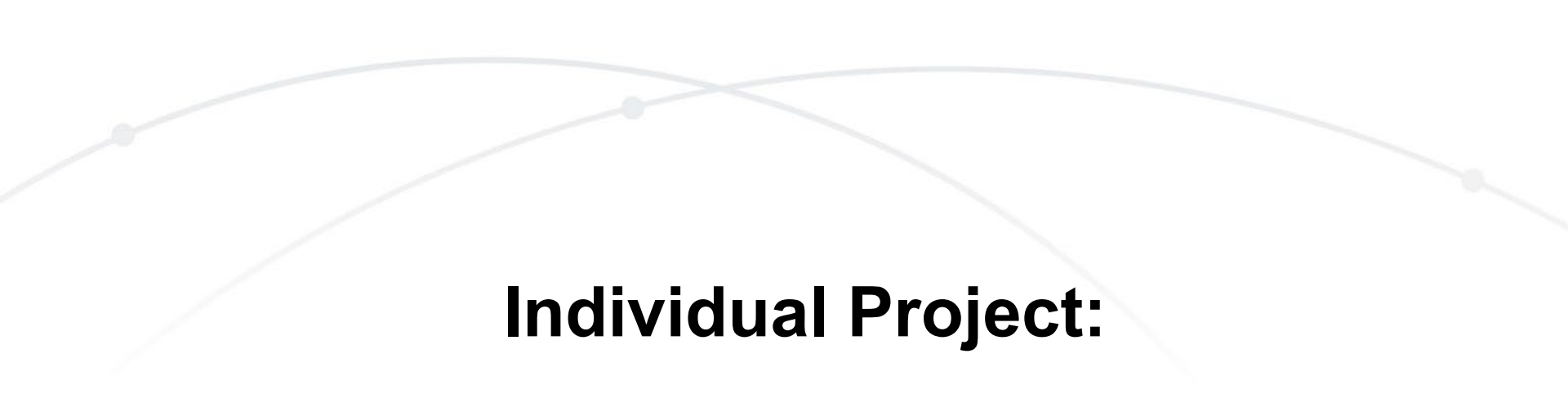
# Plan of the Week (POW):

## ACTION ITEMS

- Gather data from tenants (tour)
- Compare facility features with current documents (tour)
- Outline Student Symposium poster
- Begin numerical analyses for top ideas
- Student Symposium application (today)

Continued progress is being made towards our deliverables.

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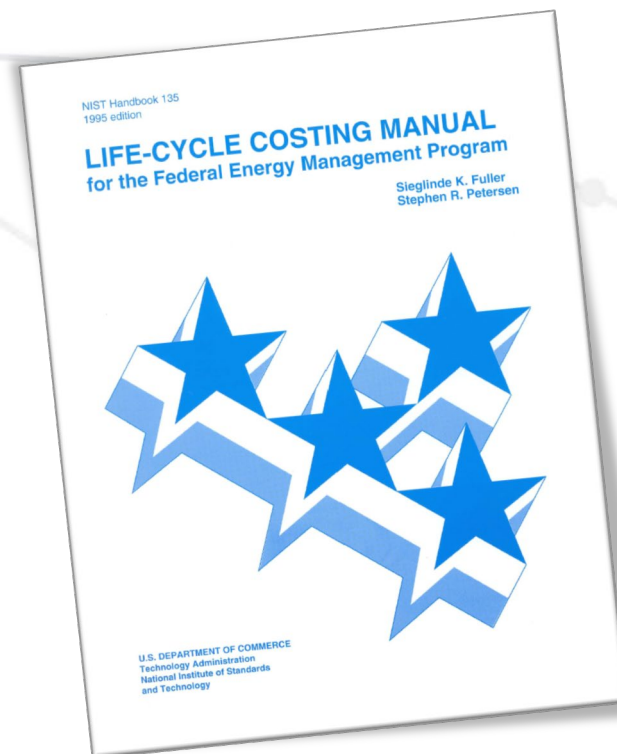
# **Individual Project:**

## **Life-Cycle Cost Analysis (LCCA) Calculator**

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# Why a calculator?

- LANL engineers struggling to commit time to thorough LCCA
- Required by Engineering Standards Manual STD-342-100
- Process outlined in the NIST Handbook 135 (1995), with annual supplemental rates



LANL Engineers need an easier way to analyze LCC.

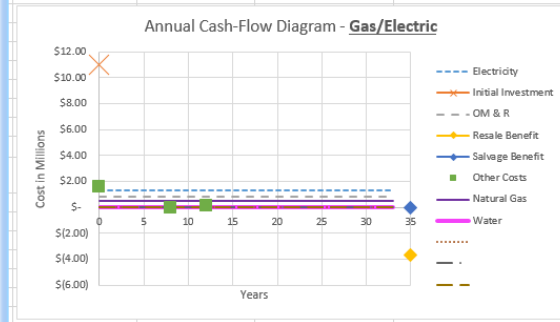
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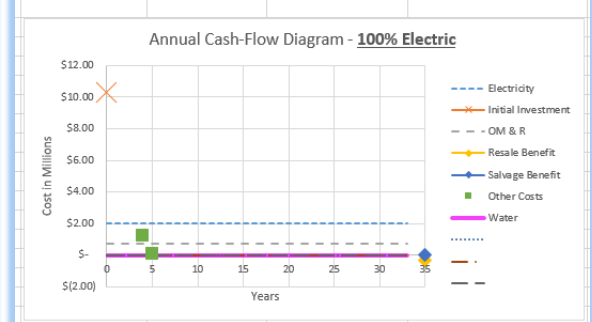
# Calculator Example:

Cost of Gas vs. Electric LCC Analysis Calculator		
- See Appendix C in NIST Handbook 135 for Guidance		
<b>PROJECT IDENTIFICATION</b>		<b>Notes</b>
Project Name:	Fun Project Yay	
Fiscal year:	1995	
Location:	LANL	DoE region
Base Date (BD):	5/3/2019	MM/DD/YYYY
Service Date (SD):	8/25/2022	MM/DD/YYYY
Design Feature to be Evaluated:	Energy source	
List Constraints:		Attach page if needed
Energy/Water Conservation Study? (FEMP)	Yes	(yes or no)
OMB A-94?	No	Office of Management and Budget circular?
<b>BASE CASE AND ALTERNATIVES</b>		
Name and describe base case and alternatives to be analyzed:		
Base case is 100% electric energy, as preferred by management.		
<b>GENERAL INFORMATION:</b>		
Name of Analyst:	Matney Juntunen	
Phone Number:	406-203-8951	
Z-Number:	341830	
Date of Study Completion:	6/12/2019 MM/DD/YYYY	
<b>KEY DATES</b>		<b>Notes</b>
Years of Life:	35	Quantity (commonly 35)
BD:	5/3/2019	years)
SD:	8/25/2022	
End of Study:	6/12/2019	

CASH FLOWS (IN MILLIONS) FOR GAS/ELECTRIC			
CATEGORY	YEAR # IN LIFETIME	COST PER YEAR	Notes
Initial investment:	0	\$ 11.00	
Total Electricity:	all	\$ 1.30	(Usually \$0.08 per kW/h)
OM & R:	all	\$ 0.80	
Total Natural Gas:	all	\$ 0.50	(Usually \$3.5 per million Btu)
Water:	all	\$ 0.00000170	
	all		
	all		
	all		
Gas Line Extension	0	\$ 1.60	
Fan Replacement	12	\$ 0.16	Other One-Time Costs (replacements, disposal, etc.)
Economizer Install	8	\$ 0.0125	
Resale value:	35	\$ 3.70	End of Life Expectancy
Salvage Value:	35	\$ 0.03	End of Life Expectancy
Total Cost of Lifetime (Millions):		\$ 474.05	



CASH FLOWS (IN MILLIONS) FOR 100% Electric			
CATEGORY	YEAR # IN LIFETIME	COST	Notes
Initial investment:	0	\$ 10.30	
Total Electricity:	all	\$ 2.00	(Usually \$0.08 per kW/h)
OM & R:	all	\$ 0.70	
Water	all	\$ 0.0000017	
	all		
	all		
	all		
Fan Replacement	12	\$ 1.20	Other One-Time Costs (replacements, disposal, etc.)
Economizer Install	4	\$ 0.10	
Resale value:	35	\$ 0.35	End of Life Expectancy
Salvage Value:	35	\$ 0.03	End of Life Expectancy
Total Cost of Lifetime (Millions):		\$ 455.93	



User entries are coded for processing throughout the workbook.

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# Calculator Example Continued:

Specify <u>Gas/Electric</u> Investment Costs: (in Millions)						
CATEGORY	AMOUNT	Notes	DISCOUNT FACTOR	Notes	FACTOR TABLE NO.	PRESENT VALUE
Initial Investment:	\$ 11.00		1	(Inflation	-	\$ 11.00
Resale:	\$ (3.70)		0.554	included in	A-1	\$ (2.05)
Salvage:	\$ (0.03)			NIST		\$ -
Fan Replacement	\$ 1.25	See previous sheet values and parts	0.701	Handbook	A-1	\$ 0.88
Economizer Install	\$ 0.01		0.692	135 Annual		\$ 0.01
				Suppliment		\$ -
				discount		\$ -
				factors)		\$ -
						\$ -
Total Investment-Related Costs:						\$ 9.84
Specify <u>Gas/Electric</u> Operation-Related Costs: (in Millions)						
CATEGORY	AMOUNT	Notes	DISCOUNT FACTOR	Notes	FACTOR TABLE NO.	PRESENT VALUE
Total Electricity:	\$ 1.30		15.13	(Inflation	Ba-3	\$ 19.67
OM & R:	\$ 0.80		14.88	included in	A-2	\$ 11.90
Total Natural Gas:	\$ 0.50			NIST		\$ -
Water:	\$ 0.00	See previous sheet values and parts		Handbook		\$ -
				135 Annual		\$ -
				Suppliment		\$ -
				discount		\$ -
				factors)		\$ -
						\$ -
Total Operation-Related Costs:						\$ 31.57
Total Gas/Electric Present Value Life Cycle Costs:						\$ 41.41

Calculate Savings-to-Investment Ratio:				
Operational-Related Costs:	Lower-First-Cost Option		Higher-First-Cost Option	
	Savings		Savings	
Total Energy:	\$ 30.26	\$ 19.67	\$ 10.59	
OM & R:	\$ 10.42	\$ 11.90	\$ (1.49)	
Water:	\$ -	\$ -	\$ -	
Sum of Other Costs:	\$ -	\$ -	\$ -	
Total Op. Savings (in Millions):				\$ 9.10
Investment-Related Costs:	Higher-First-Cost Option		Lower-First-Cost Option	
	Savings		Savings	
Initial Investment:	\$ 11.00	\$ 10.30	\$ 0.70	
Resale+Salvage:	\$ (2.05)	\$ (0.22)	\$ (1.83)	
Sum of Other Costs:	\$ 0.88	\$ 0.91	\$ (0.03)	
Total Additional Investment (in Millions):				\$ (1.15)
Savings-to-Investments Ratio (SIR):				-7.8903

Discount Payback Period Result:			
First Positive Savings:	\$	0.462	
PAYBACK PERIOD:		2	
FISCAL YEAR OF DISCOUNT PAYBACK:		2024	

Calculations are visible to the user, but the main objectives are clearly outlined.

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# Accomplishments and Barriers:



## ACCOMPLISHMENTS:

- First draft demonstrating the example provided in NIST Handbook 135
- Printer-friendly
- Assignment for TA-15 office trailers
- Assignment for TA-16 fire station

## BARRIERS:

- Response time from sources regarding line-item costs
- First “real” run

The purpose of these actions is to assist LANL with informed investments.

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# Plan of the Week (POW)

## STEPS OF ACTION

- Receive cost estimates from current projects
- Use similar past projects to extract missing values
- Use line-item information to run LCCA projects

Collaboration with project personnel allows the LCCA to occur.

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# Questions?

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